

REMARKS

Claims 14, 16, 18-20, 22-35, 37-46, 49 and 51 are rejected. Claims 14, 16, 18-20, 22-35, 37-46, 49 and 51 are presently pending in the application. Favorable reconsideration of the application in view of the following remarks is respectfully requested.

Rejection of Claims 14, 16, 18-20, 22, 24-35, 37-46, 49-51 Under 35 U.S.C.

§103(a):

The Examiner has rejected Claims 14, 16, 18-20, 22, 24-35, 37-46 and 49-51 under 35 U.S.C. 103(a) as being unpatentable over FISHER (US 6,579,927), indicating that FISHER discloses a composition for nanocomposite material comprising block copolymer, clay and matrix copolymer, the block copolymer of FISHER has block (A) compatible with the clay component and block (B) compatible with the matrix resin, the matrix polymer of the prior art of FISHER is selected from polyesters such as polyethylene terephthalate, polyamides, polyolefins such as polyethylene or polypropylene and the like, the prior art of FISHER discloses that already patented composition can be utilized to make any type of molded article and, therefore, in the light of the above discussion, it would have been obvious for one having ordinary skill in the art at the time of the instant invention to utilize the prior art of FISHER to obtain the claimed invention.

Fischer discloses a nanocomposite material of clay in a polymeric matrix, including a block copolymer or a graft copolymer which has an (A)-block compatible with the clay and a (B)-block compatible with the polymeric matrix. Fischer fails to disclose the use of the nanocomposite material in an extruded imaging support. Fischer also fails to disclose the use of clay, intercalated with a polyether block polyamide copolymer, which is dispersed in a matrix polymer of polyolefin or polyester.

The present invention relates to an extruded imaging element comprising a support of intercalated clay intercalated with a polyether block polyamide copolymer in a matrix polymer of polyolefin or polyester.

To establish a prima facie case of obviousness requires, first, there must be some suggestion or motivation, either in the reference itself, or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable

expectation of success. Finally, the prior art reference must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in the applicant's disclosure. *In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998).

Fischer teaches nanocomposite materials comprising block copolymer, clay and matrix copolymer. The block copolymer of FISCHER has hydrophilic block (A) compatible with the clay component and block (B) compatible with the matrix resin for use in packaging and construction materials. Fischer fails to mention the use of intercalated clay, intercalated with a polyether block polyamide copolymer, for use as an extruded base or support for an imaging element. Fischer also fails to disclose the use of clay, intercalated with a polyether block polyamide copolymer, which is dispersed in a matrix polymer of polyolefin or polyester. In addition, Fischer teaches in col.3, lines 61-66 that *"The structural units (B) are compatible with the polymeric matrix. By this is meant that these units in themselves, i.e. not in the copolymeric form with the structural units (A), are excellently mixable with the material of the polymeric matrix. It is also possible that the nature of the structural units (B) is the same as the nature of the polymeric matrix."* The Examiner also notes that the block copolymer of FISHER has block (A) compatible with the clay component and block (B) compatible with the matrix resin. However, the present claims are directed to clay, intercalated with a polyether block polyamide copolymer and dispersed in a matrix polymer of polyolefin or polyester. Polyamide and polyether, the components of the presently claimed block copolymer, are neither *"excellently mixable"* nor of the *"same as the nature of the polymeric matrix"*, but are considered immiscible with the presently claimed matrix binder. This fact is known in the art. See Attachment A, Polymer Alloys and Blends: Thermodynamics and Rheology, Leszak A, Ultracki, Hanser Publishers, Munich Vienna New York, 1990, pgs. 172, 207, and 213. See also Attachment B, Analysis of the morphology of polymer blends using ultrasound, Claude Verdier and Monique Piau 1996, J. Phys. D: Appl. Phys. 29, 1454-1461. Therefore, one would not use the teachings of Fischer to predict that the presently claimed block copolymer intercalant could be used with the presently claimed matrix polymer with which it is immiscible. As a result, Fischer fails to suggest modification of

the reference to produce an extruded base for an imaging element comprising intercalated clay, intercalated with a polyether block polyamide copolymer as presently claimed.

Fischer also offers no expectation that intercalated clay, intercalated with a polyether block polyamide copolymer, may be used as an extruded base or support for an imaging element when dispersed in a matrix polymer of polyolefin or polyester. There are a very large number of clays, block copolymers and matrix copolymers disclosed in Fischer and known to those skilled in the art. Although Fischer teaches that the nanocomposite composition of the prior art can be utilized to make molded articles of any kind, in the absence of any suggestion in Fischer to extrude an imaging base utilizing the claimed nanocomposite material, at most, it might only be "obvious to try" the combination of the present invention for extruding an imaging base. There is no reasonable expectation of success found in the cited reference to indicate that a copolymer with a B-block that is immiscible with the matrix polymer will be useful as taught in Fischer.

Finally, Fischer fails to make mention the use of clay, intercalated with a polyether block polyamide copolymer, in a matrix polymer of polyolefin or polyester for use as an imaging elements or production of an extruded imaging element as required by the present claims.

In addition, the present invention provides surprising results. As indicated by the prior art (Attachments A and B above), polyether block polyamide copolymer would be expected to be incompatible with a matrix polymer of polyolefin or polyester. However, the combination as claimed forms an imaging element support with acceptable and useful properties, including improved Young's modulus. Also, as noted on page 28, lines 16 – 22, the intercalated clay, intercalated with a polyether block polyamide copolymer, as presently claimed has antistatic properties, a particularly useful property in photographic supports.

As discussed above, the Applicants request reconsideration of the rejection, believing that Fischer fails to discuss or suggest the specific limitations of the present invention, fails to teach or suggest modification of the reference and fails to provide any likelihood of success.

Rejection Under 35 U.S.C. §103(a):

The Examiner has rejected Claims 18-20, and 23 under 35 U.S.C. 103(a) as being unpatentable over ACQUARULO (US 6,833,392) in view of FISHER (US 6,579,927), as it would have been obvious to one having ordinary skill in the art at the time of the instant invention to utilize the polyesters of FISHER in the composition of FISHER and thereby arrive at the present invention.

As discussed above, the Applicants believe that the presently claimed invention is not obvious in light of the cited references to Acquarulo in view of Fischer. In order to support a finding of prima facie obviousness, references must contain a suggestion or motivation to combine, must give some reasonable expectation of success, and must teach or suggest all claim limitations. As discussed above, the Applicants believe that Fischer fails to discuss or suggest the specific limitations of the present invention, fails to teach or suggest modification of the reference and fails to provide any likelihood of success. Acquarulo also fails to teach or suggest modification of the references, either alone or combined, as Acquarulo fails to teach intercalation of clay with polyether block polyamide copolymer – intercalated clay or intercalation of clay with polyether block polyamide copolymer – intercalated clay followed by dispersion in a matrix polymer of polyolefin or polyester.

At best, a combination of the references would produce a nanocomposite material comprising block copolymer, clay and matrix copolymer, the block copolymer having hydrophilic block (A) compatible with the clay component and block (B) compatible with the matrix resin PEBAX, not the presently claimed clay, intercalated with polyether block polyamide copolymer in a matrix polymer of polyolefin or polyester.

The Examiner indicates that, with respect to the argument that intercalation of the polymer in the disclosure of ACQUARULO is not inherent characteristics, the clay component of ACQUARULO is intercalated with ammonium cation, which in fact will inherently increase basal spacing between clay platelets, the prior art of ACQUARULO further discloses that the clay component has platy structure with high aspect ratio, and, if the clay of ACQUARULO was not treated then it would be in form of an aggregate and aggregates of clay are not considered nano-clays. The Examiner also indicates

that shear action such as that caused by extruder further ensures the delamination of clay platelets and intercalation of polymer between clay platelets. In the present invention, the polyether block polyamide copolymer penetrates the clay aggregate to produce the initial increase in basal spacing. Agitation and/or pretreatment with another material is not required. Table 1 on pg. 26 of the specification identifies the (001) basal plane spacing of unmodified, that is, unintercalated, Na Cloisite clay as equal to 10Angstrom (Table 1, pg. 26). Initial basal spacings of untreated clays are known in the art. See U.S. Pat. No. 6,841,226, col. 8, lines 26-28; U.S. Pat. No. 6,767,952, col. 15, lines 41-42; U.S. Pat. No. 6,767,951, col. 12, lines 42-43. Once the polyether block polyamide copolymer is added, the (001) basal plane spacing, increases to 18Angstroms. It is known by those of skill in the art that intercalated layered materials have a (001) basal plane spacing of around 20 Angstroms (U.S. Pat. No. 6,762,233, col. 6, lines 34 and 48; U.S. Pat. No. 6,888,663, col. 3, lines 35-37 (discussing an article published in 1975)). Layered materials which have already been intercalated (organoclays) are also shown in Table 1. Already treated, that is, pre-intercalated, clays are also known in the art and would be recognizable to one of ordinary skill in the art, since the (001) basal spacing is greater than the baseline level for the same untreated material, typically with a (001) basal plane spacing of around 20 Angstroms. See U.S. Pat. No. 6,841,226 col. 8, lines 60-67 (illustrating the basal spacing of a known pre-intercalated organoclay); U.S. Pat. No. 6,841,226, col. 2, lines 37-44; U.S. Pat. No. 6,767,952, col. 3, lines 1-5 and col. 15, lines 41-42; U.S. Pat. No. 6,767,951, col. 12, lines 42-43: see previously submitted Attachment E, col. 1, lines 7-14, Schematics A and B. Acquarulo specifically indicates that montmorillonite should be modified prior to incorporation into the polymer (col. 2, line 65– col. 3, line 6). In terms of the present invention, the montmorillonite is modified with polyether block polyamide copolymer prior to incorporation of the clay into matrix polymer.

The Examiner refers Applicant to the second experiment in col. 4 of Acquarulo regarding Applicants argument that Acquarulo fails to teach clay intercalated with polyether/polyamide block copolymer. Again, the Clay Cloisite 30B is already intercalated with organic modifier MT2EtOT (Attachment F of the Response dated May 2, 2005) when the PEBAX is added. PEBAX is added after the clay is intercalated and is equivalent to the matrix polymer, as described in the

present application. In the present invention, the polyether block polyamide copolymer is the "organic modifier" and initially penetrates the clay aggregate to produce the initial increase in basal spacing, in place of the MT2EtOT.

The Examiner indicates that although Fisher does not teach clay component intercalated with polyether/polyamide block copolymer, such teaching is provided by the disclosure of Acquarulo. Acquarulo refers to any polymer added to the dispersed clay mixture as the intercalant, whereas, as discussed above, the Applicants polyether block polyamide copolymer intercalant is not simply a component in the mixture with the clay, but initially penetrates the clay aggregate, spreading (intercalating) the lattice layers to produce the dispersible, non-aggregate state of the clay.

The Examiner indicates that, with respect to the argument that the structural units A and B of FISHER are not in copolymeric form with structural units A (col. 6, lines 61-66 of Fisher), the prior art of FISHER teaches intercalation with block or graft copolymer and what is meant by the passage cited by the applicants is not that the structural units B do not form block copolymer with structural units A, but that their nature assures compatibility with polymeric matrix. In fact, the units B as further disclosed in col. 4 are polymeric components. Applicants point is that units B according to the present invention are not compatible with the polyolefin or polyester polymeric matrix presently claimed. See previously submitted Attachment A, pg. 213, lines 7-9 and 20-24, pg. 207, section 3.7.3, lines 8-10, pg. 172, Table 3.5-IIb #16 and #21; Attachment B, pg. 1 of 6, Abstract lines 2 and 6-7; pg. 3 of 6, line 11, pg. 4 of 6, Abstract lines 3-4 and 14-15. This is contrary to the teachings of Fisher.

The Examiner indicates that t FISHER teaches additional matrix component such as polyolefin or polyester, that is definitely mixable with the block polymer such as PEBAX. Applicants have included a sample of PEBAX in PET (Sample 1) and PEBAX in low density polyethylene (LDPE) (Sample 2). These samples more visually illustrate the immiscibility evidence previously submitted in Attachments A and B. Sample 3 is a comparison sample of PET only.

Since the cited references do not teach, suggest or disclose the present invention when considered as a whole with all limitations, the Applicants

respectfully suggest that the cited references do not support a rejection based on obviousness.

Rejection Under 35 U.S.C. §103(a):

The Examiner has rejected Claims 14, 16, 18-35, 37-46, 49-51 under 35 U.S.C. 103(a) as being unpatentable over O'NEIL (WO 01/034685) in paragraph 4 of the Office communication mailed 8/18/2005. However, on pg. 6, the Examiner indicates that the prior art of O'Neil is withdrawn. The Applicant is confused regarding the status of this rejection in light of the stated withdrawal of the art. In case the rejection still stands, Applicant repeats the previous arguments.

The Examiner has rejected the Claims as being unpatentable over O'NEIL (WO 01/034685), indicating that the prior art of O'NEIL discloses clay/polymer composites that can be formed into an article by melt blending and extrusion, a montmorillonite type clay that can be intercalated with ammonium type compounds (page 4, line 15, page 1, line 23), Example 2 specifically discloses polyamide ether block copolymer, Claims 8 and 9 further teach that the polyamide block is nylon block and the elastomeric block is polyether, polyester and the like, Example 2 of O'NEIL further discloses use of second polymer, which is nylon, the specification on page 5 further teaches use of polyolefins, polyesters and the like, the composition can be utilized to make flexible extruded article having improved mechanical properties, and, therefore, it would have been obvious to one having ordinary skill to utilize composition of O'NEIL as a base or a substrate and therefore obtain the claimed invention.

O'Neil discloses nano clays for use in thermoplastic/ thermoset polymer materials, wherein the nano clay may be combined with another chemical ingredient, such as a crosslinking agent, to thereby provide a unique and overall synergistic effect on mechanical property performance.

In order to support a finding of prima facie obviousness, references must contain a suggestion or motivation to combine, must give some reasonable expectation of success, and must teach or suggest all claim limitations. The reference to O'Neil teaches that the clay used is Montmorillonite type clay that can be intercalated with ammonium type compounds and that the intercalating polymer is block copolymers. Also, O'Neil pg. 5, lines 5-10 indicate that the block copolymers are used as matrix polymers, not intercalants for the clay.

O'Neil fails to teach or suggest that block copolymers, specifically, polyether block polyamide copolymers can be used as clay intercalants. O'Neil also fails to teach the utility of just the polyether block polyamide copolymer – intercalated clay in a matrix polymer of polyolefin or polyester as an extruded article. Neither does O'Neil provide any likelihood of success for the use of block copolymer, specifically, polyether block polyamide copolymers intercalants, teaching instead that, to be used in block copolymers, the clay is already intercalated by some other material, not the presently claimed block copolymer. The Examples of O'Neil utilize Nancor TGC 130 Clay and Cloisite 30B. Review of the literature available from the suppliers of these products indicate that both materials used in the Examples are intercalates, that is, clay materials intercalated with surface treating materials (intercalants), prior to combination with Nylon or PEBAX, supporting the Applicants position that the reference fails to teach the use of block copolymer as intercalant (“clay intercalated with polyether block polyamide copolymer”). See Attachment C (directions to Nancor web page), Attachment D (definitions from Nancor web page, including intercalate, intercalant, Nanomer nanoclays), Attachment E (describing surface treatment / intercalation of natural clay prior to combination with matrix polymer to produce exfoliation), Attachment F (description of Cloisite 30B as modified montmorillonite). Finally, O'Neil fails to teach the intercalation of clay with a polyether block polyamide copolymer in a matrix polymer of polyolefin or polyester for use as an extruded imaging element as presently claimed. Claims 8 and 9 depend from claim 7 and describe the matrix polymer, not the clay intercalant. Example 2 also relates to variation of the matrix polymer, replacing the matrix polymer of Example 1, nylon, with the matrix polymer PEBAX, again, not the clay intercalant.

The Examiner indicates that the intercalating polymer is block copolymers. The Applicants have been unable to locate the section in O'Neil that states that the intercalating polymer is block copolymers and request the Examiner specifically cite the line and page number.

The Examiner notes that “the present invention does not exclude use of additional intercalants and that, with respect to PE/PA polymer, it is clear from the disclosure of O'NEIL that PE/PA can be viewed as intercalant. It is incorporated into the clay platelets but it does not cause exfoliation of the clay platelets. Clay platelets are exfoliated upon incorporation into polymer matrix

and sheer action of the equipment by which they are processed.” However, the present claims require that the polyether block polyamide copolymer functions as an intercalant, that is, enters the layers of clay, swelling them sufficiently to allow combination with the polymer matrix of polyolefin or polyester. Even if another intercalant is present, the polyether block polyamide copolymer is required by the claims to function as an intercalant, not as a dispersing matrix.

As discussed above, it is known in the art that “Swellable layered materials, such as the preferred smectite clay materials, generally require treatment by one or more intercalants to provide the required interlayer swelling and/or polymer compatibility. The resulting interlayer spacing is critical to the performance of the intercalated layered material in the practice of this invention. As used herein, the “interlayer spacing” refers to the distance between the faces of the layers as they are assembled in the intercalated material before any delamination (or exfoliation) takes place.” U.S. Pat. No. 6,475,696, col. 5, lines 15-24. In the untreated state, the clay “materials do not delaminate in host polymer melts regardless of mixing because their interlayer spacings are usually very small (typically equal to or less than about 0.4 nm), and consequently the interlayer cohesive energy is relatively strong.” U.S. Pat. No. 6,475,696, col. 5, lines 26-30. “Layered materials are intercalated by swelling agents of sufficient size to increase interlayer distances to the desired extent.” U.S. Pat. No. 6,475,696, col. 5, lines 32-34.


The prior references fail to teach the use of polyether block polyamide copolymer as an intercalant used to swell the layered material, allowing dispersion/exfoliation in a matrix polymer. The Examples of the present invention show that the addition of polyether block polyamide copolymer to natural montmorillonite, Cloisite Na (Attachment G), with a basal spacing of 10 angstroms (Table I, pg. 26), results in a swelling of the basal spacing to 18 angstroms (Table 2, Ex. 1, 8, and Comp A, pg. 27), indicative of intercalation of the clay. The Examples also indicate that surface modified clays 25A (Attachment H), 20A (Attachment I), 15A (Attachment J) and 6A, with basal spacing of 21 angstroms, 25 angstroms, 32 angstroms, and 34 angstroms, respectively are further swelled / intercalated by the addition of polyether block polyamide copolymer, as indicated by further swelling to 32 angstroms, 38 angstroms, 37 angstroms, and 37 angstroms, respectively, indicative of additional

intercalation beyond that achievable with simple surface treatment of the clay.
See Table 2, pg. 27). Exfoliation is expected at basal separations of 70 angstroms.
(Attachment K)

Since the cited reference to O'Neil does not teach, suggest or
disclose the present invention when considered as a whole with all limitations, the
Applicants respectfully suggest that the cited reference does not support a
rejection based on obviousness.

It is believed that the foregoing is a complete response to the
Office Action and that the claims are in condition for allowance. Favorable
reconsideration and early passage to issue is therefore earnestly solicited.
Applicants respectfully request early allowance to obviate the appeal.

Respectfully submitted,


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Enclosures: Samples 1, 2 and 3

If the Examiner is unable to reach the Applicant(s) Attorney at the telephone number provided, the
Examiner is requested to communicate with Eastman Kodak Company Patent Operations at
(585) 477-4656.